

REMARKS

The outstanding Office Action addresses and rejects claims 1-62. Applicant respectfully requests reconsideration of the present application in view of the amendments set forth above and the remarks below.

Independent claim 1 is amended to clarify that the boron free chopped glass fibers have an average fiber diameter in the range of about 5.0 microns to 9.0 microns. Support for this amendment can be found throughout the specification, for example, at page 9, lines 14-18. No new matter is added.

The Present Invention

Independent claim 1 recites a nonwoven filter media comprising *glass wool fibers* essentially free of boron and *chopped glass fibers* essentially free of boron. The chopped glass fibers have an average fiber diameter in the range of about 5.0 microns to 9.0 microns, and have more than about 10% by weight of aluminum oxide and more than about 20% by weight of calcium oxide. Claim 1 further requires that the chopped glass fibers be interspersed throughout the glass wool fibers.

Claim Rejections Pursuant to 35. U.S.C. §103(a)

A. Claims 1-12 and 18-62

The Examiner rejects claims 1-12 and 18-62 pursuant to 35 U.S.C. §103(a) as being obvious over Paper 22/97E in view of U.S. Patent No. 3,847,626 of Erickson et al. (Erickson). In particular, the Examiner argues that Paper 22/97E teaches HEPA filter media formed from boron free glass reinforcing fibers (e.g., chopped glass fibers) having a diameter of 6-7 microns, and boron-free glass wool fibers. The Examiner admits, however, that Paper 22/97E fails to teach chopped glass reinforcing fibers having more than about 10% by weight of aluminum oxide and more than about 20% by weight of calcium oxide. Thus, the Examiner relies on

Erickson to teach a reinforcing chopped boron-free fiber having the claimed components. The Examiner argues that it would have been obvious to combine the glass wool fiber of Paper 22/97E with the chopped glass fiber of Erickson to arrive at the present invention. Applicant respectfully disagrees.

(1) Paper 22/97E Does Not Teach Boron-Free Chopped Glass Fibers

The Examiner argues that Paper 22/97E discloses both components of Applicant's invention - namely boron-free glass wool fibers and boron-free chopped glass fibers – but admits that the boron-free chopped glass fibers do not contain the claimed amounts of calcium oxide and aluminum oxide. The Examiner has misinterpreted Paper 22/97E. While Applicant does not dispute the fact that Paper 22/97E discloses boron-free *glass wool* fibers, Paper 22/97E *does not* disclose boron-free *chopped glass* fibers, much less chopped glass fibers having a fiber diameter in the range of about 5 to 9 microns and having the claimed amounts of calcium oxide and aluminum oxide.

Paper 22/97E states “[t]raditional HEPA media contain microglass fibers with diameters between 0.1 and 3 μm . Reinforcement fibers of 6-7 μm in diameter are usually used as well.” (Introduction, third paragraph). “Traditional HEPA media, however, contain glass fibers with *boron* as one of the elements constituting the glass network structure.” (Introduction, second paragraph, *emphasis added*). Thus, Paper 22/97E discloses *boron-containing chopped glass* fibers – not *boron-free chopped glass* fibers, as required by the present invention. Paper 22/97E does not teach or even suggest using any of the disclosed boron-free fiber compositions as *chopped glass* fibers. In fact, Paper 22/97E even states that boron-free reinforcement fibers are not known. Section 5 of Paper 22/97E goes on to speculate that “[r]einforcement fibers from boron-free glass-based raw materials will be available at a later date.” (Section 5, third paragraph).

Accordingly, Paper 22/97E only teaches one component of Applicant's claimed invention, namely the glass wool fibers. Paper 22/97E does not disclose boron-free chopped

glass fibers, as required by claim 1. Paper 22/97E is therefore deficient as a reference for reasons other than those already acknowledged by the Examiner.

(2) *Erickson Also Fails To Teach Boron-Free Chopped Glass Fibers*

Erickson does not remedy the deficiencies of Paper 22/97E. While Erickson does disclose a boron-free glass composition having 11-18% aluminum oxide and 9-25% calcium oxide, the glass fibers are glass *wool* fibers, not *chopped* glass fibers, as required by claim 1. As set forth in the specification, Erickson discloses a glass composition that can be drawn into fine fibers "having a diameter of about 15×10^{-5} to 55×10^{-5} inches [0.0381 to 0.1397 microns]." (Erickson, Col. 4, lines 8-10). This diameter range is consistent with the diameter required to make *glass wool fibers*, which are very thin fibers that have a diameter in the range of about 0.1 microns to 3 microns. Erickson, therefore, is limited to *glass wool* fibers. Erickson does not teach or even suggest *chopped glass* fiber with a diameter in the range of about 5 microns to 9 microns as required by claim 1. Erickson therefore does not remedy the deficiencies of Paper 22/97E.

(3) *The Combination of Paper 22/97E and Erickson Therefore Does Not Teach the Present Invention*

As stated above, both Paper 22/97E and Erickson are limited to the first component of Applicant's invention, namely boron-free *glass wool fibers*. Neither reference teaches or even suggests a boron-free *chopped glass fibers* having an average fiber diameter in the range of about 5.0 microns to 9.0 microns, and having more than about 10% by weight of aluminum oxide and more than about 20% by weight of calcium oxide *fiber*. The combination thus cannot teach the present invention, and the Examiner has therefore failed to establish a prima facie case of obviousness. Claims 1-12 and 18-62 thus represent allowable subject matter.

Applicants further note that since Paper 22/97E and Erickson do not teach both *chopped glass fibers* and *glass wool fibers*, neither reference can teach chopped glass fibers *interspersed*

throughout glass wool fibers, as is further required by claim 1. Erickson only teaches one type of fiber, and thus cannot teach fibers that are *interspersed* throughout another type of fiber. Paper 22/97E does disclose different types of fibers, but merely discloses a *composite* that is reinforced using a binder. (Section 1, third paragraph). Paper 22/97E does not suggest interspersing the chopped glass fibers into the glass wool fibers. Accordingly, claims 1-12 and 18-62 further distinguish over Paper 22/97E and Erickson.

(4) *The Present Invention Provides a Novel Filter Media Having Distinct Fiber Components That Together Improve Filter Performance*

Applicants have provided a novel filter media that combines two distinct types of fibers to create a filter with improved filter performance. The glass wool fiber and chopped glass fiber components of the present invention are distinct and are processed using different methods. Glass wool fibers are very thin fibers having a fiber diameter of 0.1 to 5 microns. The fibers can be formed either by subjecting the fibers to flame attenuation to blow them apart, or by rotary-spinning the fibers in a pot. Chopped glass fibers, on the other hand, are thick fibers having a diameter of about 5 to 9 microns. The fibers are produced as continuous filaments that are precision cut to a specific length. As set forth in Paper 22/97E, the fiberization process influences the properties of the fiber. (Section 3, first paragraph). The combination of these two distinct fiber components has produced a novel filter media that has several advantages over the prior art. By interspersing the chopped glass fibers through the glass wool fibers, the present invention advantageously provides a filter media having an improved structural integrity and crease strength. The filter media has improved tensile strength, which is maintained after humid aging. Accordingly, since both Paper 22/97E and Erickson are limited to glass wool fibers and do not teach or even suggest any type of chopped glass fiber, claims 1-12 and 18-62 represent allowable subject matter.

B. Claims 13 and 14-17

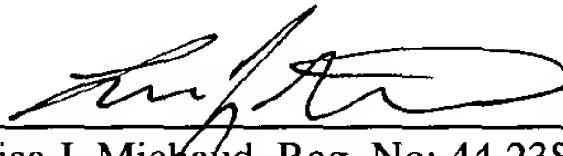
The Examiner rejects claim 13 pursuant to 35 U.S.C. §103(a) as being obvious over Paper 22/97E in view of U.S. Patent No. 6,155,432 of Wilson et al., and claims 14-17 pursuant to 35 U.S.C. §103(a) as being obvious over Paper 22/97E in view of U.S. Patent No. 5,156,780 of Kenigsberg et al. Claims 13-17 depend from claim 1, and thus all the aforementioned reasons represent allowable subject matter at least because they depend from an allowable base claim.

Conclusion

In view of the amendments and remarks above, Applicant submits that claims 1-62 are in condition for allowance. Applicants encourage the Examiner to telephone the undersigned in the event that such communication might expedite prosecution of this matter.

Respectfully submitted,

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AMENDED CLAIMS WITH MARKINGS TO SHOW CHANGES MADE

1. (Twice Amended) A nonwoven filter media composite, comprising:
glass wool fibers essentially free of boron; and
chopped glass fibers essentially free of boron and having an average fiber diameter in the range of about 5.0 microns to 9.0 microns, the chopped glass fibers having more than about 10% by weight of aluminum oxide and more than about 20% by weight of calcium oxide, wherein said chopped glass fibers are interspersed throughout said glass wool fibers.

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